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ANNOYANCE FROM LIGHT AIRCRAFT
INVESTIGATION CARRIED OUT AROUND FOUR AIRPORTS NEAR PARIS

Translation of "La gêne causée par l'aviation légère - enquête effectuée autour de quatre aérodromes de la région parisienne," Centre D'etudes et de Recherches Psychologiques Air (CERPAIR) and Analyse, Recherche et Conseil En Marketing et Communication (ARCmc), Paris, France, February 1978, pp 1-72

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16. Abstract

The development of aviation traffic at certain airports (particularly in the vicinity of Paris) and the resulting protests have lead to an investigation of the noise pollution and its annoying effects on neighboring residents.

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NOTE

This copy does not contain the appendices, only the isopsophic curves of the different grounds have been included at the end.

CONCLUSIONS

The opinion survey carried out during the Spring of 1977 on /5
residents living near four airports around Paris provided an evaluation of the relative significance of annoyance factors versus general aviation and a verification of the psophic index validity as a means for determining the importance of this annoyance.

The main results of this study are the following:

1. Most residents are generally satisfied with the life-style in their community, both with respect to the natural environment and living quarters and to the social, economic and business environment. Accordingly, it is possible to state that the annoyance from airplane noise does not mean there is a more general unsatisfaction of this environment.

2. It is possible to evaluate the annoyance from light aircraft felt by people living near the airport by examining a series of questions relating to a certain number of daily activities likely to be disturbed by light airplane noise and which form a measuring instrument (scale).

The advantage of this instrument, which allows for a more objective evaluation of annoyance than a single general question, is confirmed by a factors analysis which isolates a factor related to this annoyance, which is often created more by psychological than sociological factors: attitude toward the local airport, fear of future airport expansion, individual sensitivity to noise.

3. We had to separate the case of Chavenay from the other three airports. Even though the residents live in zones with less exposure to light aircraft noise, when interviewed they expressed more annoyance than the residents living near the other airports. Moreover, this annoyance does not vary significantly from one zone to another. Additionally, they are the ones who have already demonstrated in the form of a petition or public meeting to protest against noise from light aircrafts. The origin of the annoyance /6
expressed at Chavenay, which is not directly caused by noise from airplanes, comes mainly from the fear of seeing the airport traffic expand or develop new types of aircraft in the future. We may add to this fear the influence of socio-economic factors (socio-professional category and high incomes) and the effect of contrast produced by the presence of airplane noise in a generally low noise level environment.

4. For the other three airports, where the neighboring residents react in a consistent manner, the annoyance felt increases with the level of exposure to airplane noise up to zone 3 (psophic index ranging between 83 and 87), whereas we note a plateau for the most exposed zone, which could correspond to a saturation based on psophic index 88.

5. The present psophic index, which accounts for the noise level and the traffic volume, appropriately represents the annoyance felt. This representation capability could probably be improved by accounting for how long the noise lasts, which appears to be an important component of the annoyance from light aircraft.

6. The period where annoyance is felt the most for all four airports is during the week-end and from 2 p.m. to 5 p.m.

7. The willingness to protest varies with the airports; it is greater at Chavenay and at Guyancourt. The reputation and extent of the assumed demonstrations also appears to be greater in the vicinity of these two airports.

8. Investigation of the image of the local airport and light aircraft shows that people think of flying as a pleasure and sports activity rather than a utilitarian one. It appears that in addition to a concern that the airport will expand its traffic, the protests against aircraft noise stem from the current status of light aircraft: the opportunity to pilot is limited to a certain social economic class, i.e. its exclusive nature.

Most residents think the airport should have better facilities (for walks and pastime activities) and that the opportunity to practice flying should be made available to the youth of the community.

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ANNOYANCE FROM LIGHT AIRCRAFT
INVESTIGATION CARRIED OUT AROUND FOUR AIRPORTS NEAR PARIS

CERPAIR and ARCMC

INTRODUCTION

The results presented in this report are collected from an inves-/8* tigation carried out during the Spring of 1977 upon the request of the Direction Générale de l'Aviation Civile and the Service Technique de la Navigation Aérienne in order to gather information to evaluate the annoyance caused to people living adjacent to airports from the traffic of light propeller aircrafts.

The research was assigned to ARCmc SARL (marketing and communication consulting, research and analysis) and to CERPAIR (Army Psychology Research Center), who collaborated in performing the investigation. ARCmc was responsible for data collection in the field and CERPAIR directed the project and was responsible for data processing.

Paris Airport authorities kindly provided data on traffic and on curves of exposure to noise for the four airports.

1. Research Objectives

The current importance and development of the general aviation traffic at certain airports (particularly in the vicinity of Paris) and the protests which have resulted, give cause for an investigation of the effects of this noise pollution in order to control it and its expansion.

A survey carried out in October 1973 near the St-Cyr-l'Ecole (1) airport, made it possible to collect data on the attitudes of residents from neighborhoods adjacent to the airport towards light aviation traffic and on the existing relationship at a given point between the French psophic index N and the degree of annoyance felt. This investigation brought to light the presence of a concomitant variation between value N and the annoyance index value GO, established during a previous survey conducted in neighborhoods in the vicinity of Orly airport.

Index N should make it possible to evaluate the annoyance felt by the residents. The same survey, however, also demonstrated that the annoyance in neighborhoods around St-Cyr was not as great as anticipated from the N index rated on residents of neighborhoods around

(1) "Annoyance Caused by Light Aviation", Investigation Conducted in Neighborhoods Around Saint-Cyr-l'Ecole, S.T.N.A./2N-IFOP, Aug. 1975.

*Numbers in the margin indicate pagination in the foreign text.

Orly. In other words, compared to what it means for Orly, the psophic index appears to overestimate the annoyance at St-Cyr.

Among the reasons likely to explain this effect, the authors of /9
this study emphasized the traffic distribution during the day - most displacements occur at St-Cyr between 8 a.m. and 9 p.m. - and the shortest noise interval: "since air traffic is closer, there is less annoyance per displacement" (1).

Moreover, the number of protests made during the past few years to light aircraft traffic around certain airports in the Paris region seems to contradict these assumptions.

All this was tied to a special kind of traffic problem of light aviation around airports and thereby to a special kind of annoyance it is likely to cause to neighboring residents; this problem is tied to the image of light aviation to the extent where the representations we have of it and the perception of its traffic are interdependent.

Under these conditions, the annoyance from light aircraft must be analyzed and measured, by taking into account its special characteristics and, if present, related factors which determine them. Accordingly, there were two types of goals to be reached:

-to check the validity of the psopchic index as a means for determining the amount of annoyance from light aviation traffic, i.e. its correlation with the annoyance felt by residents adjacent to airports.

-to analyze and estimate versus this annoyance, the relative importance of the factors concerning general aviation. Without prejudicing their nature, it was possible to take into consideration:

.the number of displacements,
.traffic distribution in time,
.the values tied to light airplane traffic from the point of view of practicality and recreation.
.the image of the airport in the eyes of residents from the adjacent neighborhood versus the attitude of these residents toward their /10
environment (to what extent should the airport be perceived as an installation, a privilege, an attraction ... or on the contrary as a service, a source of pollution, a factor devaluating the environment...).

2. Method of Investigation

2.1. The Population Studied

The investigation was conducted in neighborhoods surrounding four airports in the Paris suburbs: Chavenay, Guyancourt, St-Cyr-l'Ecole and

(1) The psophic index does not take into account how long the noise lasts.

Chelles-le-Pin.

In the vicinity of these four airports, we have selected within the scope of the study an age group of 18 years old living in zones exposed to airplane noise defined by the research requesters on maps made at the Paris airport (1).

The isopsophic curves shown on these maps make it possible to distinguish four zones of exposure to light aircraft noise:

N = 70 to 75
N = 76 to 82
N = 83 to 87
N = 88 and above.

The zones for conducting interviews were defined by considering these four levels of exposure to noise and the runway circumference. Excluded from the scope of the study are zones excessively exposed to external aeronautical traffic other than light aircraft from the local airport (overhead flight zones by commercial traffic).

2.2. The Survey Questionnaire /11

The survey questionnaire has been formulated on the basis of opinion surveys already conducted for civilian aviation (1) and in the light of a first approximation to the problem of annoyance from light aircraft traffic, an exploratory approximation conducted by the ARCmc in March - April 1977.

Upon this occasion, twenty residents, including protesters, were freely questioned by the interviewers with psychologists in order to have a better understanding of the nature of the problem, the factors facing one another, the perception of light aircraft traffic and the annoyance effects caused by the latter. These exploratory interviews have notably brought to light the significance which fear could have on future air traffic in the attitudes expressed toward the current status of airport noise.

2.3. Sampling the Survey and Conducting the Interviews

The sampling survey was limited to 800 people for all four airports. The sampling schedule provided for each airport a sampling of 150 to 250 people - one per residence - distributed equally between the two sexes, three age groups: 18 - 39 years, 40 - 59 years, 60 years and older - and the four levels of exposure to noise defined

(1) - "Annoyance from Light Aircraft" - op. cit., Attitudes of the French Population Toward the Supersonic "Bang" - CERPAIR, Oct. 1971.

above. The aim of this schedule is not to establish representative samplings of the population living near each airport, but to provide an adequate number of interviewed individuals in each zone exposed to aircraft noise.

The quotas defined a priori for each sampling criteria could only have an indicative value, since we have left out the socio-demographic estimate and population composition in each zone defined on the maps. Due to the disparities encountered from one airport to another, we were finally able to interview:

. 85 people at Chavenay
.189 people at Guyancourt
.276 people at St-Cyr-l'Ecole
.250 people at Chelles-le-Pin.
800 people

A major difficulty was encountered at Chavenay where the zones of exposure to noise defined on the map are not populated enough to warrant the number of interviews provided. The number of interviews conducted in the vicinity of this airport is, however, enough to guarantee the conclusions we are looking for. The interviews which could not be conducted around the Chavenay airport were carried out around the three other airports.

The 800 interviews were carried out between May 25 and June 22 1977 by 24 male and female interviewers.

All interviews took place in the homes of the people questioned. Within each zone, we were careful to scatter the survey points homogeneously. The interviews were spread over different hours of the day, some of them took place in the evening in order to contact workers. The person selected in the home for the interview was determined on the basis of sex and age quotas defined in the sampling schedule.

The interview lasted 30 to 40 minutes. The investigation was well received and instigated cooperation and interest.

CHAPTER I - CHARACTERISTICS OF THE 4 POPULATION SAMPLES INTERVIEWED /14

1. Socio-Demographic Characteristics

The population samples interviewed in the vicinity of 4 airports are about equally distributed according to sex. Quite large differences appear, however, from one sample to another, if we consider the age of the people interviewed and especially their socio-professional category (1).

(1) See detailed results on socio-demographic characteristics in Appendix I.

The most important characteristics appear...

.at Chavenay, where 68 of the people interviewed were head of household, belonging to the socio-professional category of higher executives, members of liberal professions, industrialists and big businessmen;

.at Chelles-le-Pin, where the sampling appears, compared to the three others, distinctly more modest from the socio-professional point of view and also a little older; 23% of the people interviewed were more than 60 years old (for 6 to 9% in other locations); 5% came from affluent circles, versus 31 workers and 26% retired.

If we consider the average income level of the home, the differences between the 4 samples become more distinct: accordingly, the percentage of residents earning above 8,000 F per month rises to 55% at Chavenay, 41% at Guyancourt, 21% at St-Cyr-l'Ecole and 4% at Chelles-le-Pin.

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2. Housing Conditions

The 4 population samples of people living next to airports appear rather different by how long they have been living near the airport and by their housing conditions.

(*) (Q.1) .The length of residence is longer in Chelles-le-Pin (53% of the people interviewed have been living there for more than 10 years) and shorter at Chavenay (78% moved in during the past 5 years).

(Q.56) .Most of the people interviewed own their homes: this proportion is especially large at Chavenay (84%) and at Guyancourt (87%).

(Q.57 & 58) .Most of them live in individual homes (at Chavenay (93%), Guyancourt (99%) and Chelles-le-Pin (80%), whereas this type of dwelling is not found very often in the vicinitm of the St-Cyr-l'Ecole airport (where 94% of the residents live in apartment buildings, which are most often 6 stories high).

(Q.55) .In the zones studied, the individual home generally has a private garden and most residents live in an apartment with a balcony. Most of the people questioned have the possibility of enjoying a yard at their home, but are also directly exposed to ambient noise.

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3. Level of Satisfaction Toward the Environment

Generally speaking, most residents questioned were satisfied with the life style in their neighborhood. This positive attitude has considerable nuances from one area to another, since in most cases, the life-style at Chavenay

(Q.2)

(*) References in the left hand column relate to the tables of results presented in the appendices in the order of the question numbers they precede.

Natural and Social Environment; Living Quarters	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
Stated they were very or quite satisfied with...				
.their living quarters.....	[100]	95	91	94
.the purety of the air.....	[99]	91	91	86
.open spaces (parks).....	[98]	74	86	51
.city upkeep.....	[90]	86	85	67
.driving and parking facilities.....	[87]	73	67	59
.peoples mentality.....	84	[92]	59	77
.quietness from the point of view of ambient noise.....	(61)	(79)	(67)	(73)
Economic and Commercial Environment; Community Facilities				
Stated they were very or quit satisfied with...				
.sports or educational facilities.....	67	49	[74]	43
.entertainment facilities....	[47]	36	33	23
.the cost of living.....	40	[47]	22	15
.the proximity and number of stores.....	19	42	[72]	47
.means of public transport...	12	20	41	[66]

is considered to be very pleasant (78%) and even at Guyancourt (49%), whereas it is judged to be only sort of nice at St-Cyr-l'Ecole and at Chelles-le-Pin.

(Q.3) Furthermore, detailed opinions expressed on a dozen aspects of the local environment show that each one does not contribute on an equal level to this overall satisfaction. Accordingly, the life-style in a residential area may seem generally pleasant in spite of a poor satisfaction level regarding public transport, parks, job market, cost of living, proximity of shopping, factors contributing to the economic and business environment or to group facilities.

On the other hand, if the residents living in neighborhoods adjacent to airfields like the life-style in their area, they are also happy about their parks, fresh air, driving and parking possibilities, town maintenance, home life, relationships with neighbors and, in most cases, peacefulness from the point of view of ambient noise. These latter aspects are even more significant factors for evaluating the acceptance of the neighborhood life-style. It is likely, that due to the urban, socio-professional and economic characteristics, the population studies is particularly sensitive to the quality of the natural and social environment as well as the living quarters.

As we may see on the next table, residents from neighborhoods next to the Chavenay airport are proportionally more satisfied with this second group of factors, except for the ambient noise, which is judged less favorably at Chavenay than in neighborhoods next to the 3 other airports, whereas at Guyancourt, it is judged favorably.

In order to establish a relationship between this attitude toward the environment and the different socio-demographic and professional characteristics, we have constructed a synthetic index for "environemental satisfaction" based on a factorial analysis of all available data. The results of this statistical analysis are presented in chapter 5. /18

4. Attachment to the Neighborhood

(Q.4) A large percentage of the people questioned have already thought about or are currently planning to move to a new home (25% to 49%).

(Q.5) These states of mind are rarely motivated by ambient noise, but rather by the desire to leave Paris and return to the countryside with the idea of finding better housing conditions, becoming home owners (particularly at St-Cyr-l'Ecole where most residents interviewed lived in apartments.

At Chavenay, however, one fourth of the residents planning to move immediately give annoyance from the airport as the reason: 6% out of 25%.

5. Presence of a Week-End Home

(Q.62) One fourth of the people questioned work at least occasionally on Saturday or Sunday (20 to 28%).

(Q.63) The percentage of residents who go away for the week-end during nice weather varies from one sampling to another. Those who spend week-ends away from home represent only 2% at Chavenay, 14% at Guyancourt, 15% at Chelles-le-Pin, but 23% at St-Cyr-l'Ecole, which seems to illustrate the extent to which this practice is influenced by whether these residents have their own home, a garden; a fortiori of "living in the country" as some residents living adjacent to the Chavenay airport happened to say during the exploratory stage interviews.

6. Attitudes Toward Ambient Noise

(Q.6 & 6a) Most people interviewed said they were bothered at least part of the time by the ambient noise present in their neighborhood. For a large percentage of them, this annoyance is frequent and considerable, particularly at Chavenay.

	-a-	
	b	c
	%	%
. Chavenay	38	53
. Guyancourt	19	28
. St-Cyr-l'Ecole	26	35
. Chelles-le-Pin	24	26

Key: a-ambient noise annoys them...; b-very or quite often; c-extremely or moderately

(Q.7 & 8) Not very many had their homes sound-proofed or were thinking about doing so (9 to 16%).

We shall see later on that such home improvements did not help to reduce the noise from light airplanes, because they usually annoy residents during nice weather when the windows are open or the people are out in their garden.

7. Ambient Noise at the Place of Work

(Q.60) Among the people interviewed, a rather large percentage of them were bothered by airplane noise at their place of work. This is especially the case at Chelles-le-Pin where the population studied more frequently belongs to modest

socio-professional categories (out of 53% of the working population, 31% said that their place of work is very or quite noise). This is less frequently the case at Chavenay (18% out of 54% of the working population).

8. Individual Sensitivity to General Noise /21

The six questions asked about this subject were taken from a survey conducted on attitudes of the French population toward the supersonic bang in 1970 by CERPAIR, based on a sample representing the national population - excluding the Paris region.

These six questions form a very good Guttman type scale (reproductibility coefficient C.R. = .95, Green criterion K = .51, Dubois-Loevinger homogeneity coefficient H = .55)*

These questions are given below in the order which increases with the positive answers.

	A Great Deal %
Q.6a - Do noises you hear annoy you a great deal, moderately, a little, not at all?	
.CERPAIR 1970	11
.Chavenay	24
.Guyancourt	16
.St-Cyr-l'Ecole	15
.Chelles-le-Pin	10
Average of the 4 airports	16

	Intolerable %
Q.9 - Generally speaking, when you hear noise around you, do you find it intolerable, quite unpleasant, are you indifferent to it, or do you find it pleasant?	
.CERPAIR 1970	19
.Chavenay	13
.Guyancourt	17
.St-Cyr-l'Ecole	12
.Chelles-le-Pin	20
Average of the 4 airports	16

(1) Refer to appendix II for definition of the Guttman type scale and the coefficients.

	A Lot More Nervous
Q.10 - When you hear noise, do you feel a lot more nervous, a little more nervous or not more nervous than usual?	%
.CERPAIR 1970	29
.Chavenay	22
.Guyancourt	19
.St-Cyr-l'Ecole	19
.Chelles-le-Pin	25
Average of the 4 Airports	21

	The Slightest Noise or a Quite Small Noise
Q.11 - What kind of noise awakens you? The least amount of noise, a small noise, a rather loud noise or a very loud noise?	%
.CERPAIR 1970	43
.Chavenay	31
.Guyancourt	37
.St-Cyr-l'Ecole	32
.Chelles-le-Pin	44
Average of the 4 Airports	36

	Considerably or Moderately
Q.12 - In general, does noise tire you considerably, moderately, a little or not at all?	%
.CERPAIR 1970	55
.Chavenay	48
.Guyancourt	53
.St-Cyr-l'Ecole	50
.Chelles-le-Pin	41
Average of the 4 Airports	48

	A Deep or Small Influence
Q.13 - The fact that you live in a noisy environment, does it have a deep influence on your health, a small influence, not very much influence or no influence at all?	%
.CERPAIR 1970	65
.Chavenay	73
.Guyancourt	65
.St-Cyr-l'Ecole	71
.Chelles-le-Pin	61
Average of the 4 Airports	68

Comparison of results of neighborhoods in the vicinity of the 4 airports (variance analysis per airport and noise zone) does not reveal an appreciable difference. These results are not very different from those found at the national level during the 1970 survey. It may therefore be concluded that there is no special characteristic in this area for people living adjacent to airports. /23

The following tables give a synthesis of these results.

Airport	Noise Sensitivity Range in 10
Chavenay	5.0
Guyancourt	4.8
St-Cyr-l'Ecole	4.8
Chelles-le-Pin	4.8

Zone of Exposure	Noise Sensitivity (Range in 10)
70 - 75	4,9
76 - 82	4,8
83 - 87	5,0
88 and above	4,6

It was verified, that for each airport, there was also no difference in individual sensitivity between the inhabitants of different zones of exposure:

-a-	Chavenay	Guyancourt	Saint-Cyr-l'Ecole	Chelles-le-Pin	-b-
Zone 1 : N = 70-75	4,99	4,71	4,94	4,73	4,85
Zone 2 : N = 76-82	5,14	4,78	4,54	4,78	4,78
Zone 3 : N = 83-87	-	4,91	4,91	4,98	4,95
Zone 4 : N = 88 & + ..	-	-	-	4,64	4,64
-c-	5,00	4,78	4,84	4,75	

Key: a-Zone of Exposure; b-Average per Airport; c-Average per Zone.

CHAPTER 2 - ANNOYANCE FROM LIGHT AIRCRAFT NOISE /25

1. Construction of Annoyance Measuring Instruments

The survey questionnaire contained a group of eleven items relating to a certain number of daily activities likely to be disturbed by light aircraft noise (behavioral items): falling asleep; awakening; conversation; listening to the radio or TV; TV picture reception; reading, writing, thinking concentration; rest, relaxation; house vibrations; etc.

These same questions were asked twice, the first time for the annoyance felt during the week (Q.28), the second time for the annoyance felt during the week-end (Q.29).

A certain number of measuring instruments (scales), make it possible to obtain synthetic indices of this annoyance for each person interviewed. They have been constructed from the answers given to these eleven questions relating to the week-end, then applied to the answers relating to the week, after verification of the value of these instruments in both cases. In fact, the annoyance declared was on the average higher during the week-end, hence, we were in a situation likely to produce the most diversified answers and therefore conducive to obtaining a measuring instrument capable of capturing the different possible annoyance values from the lowest to the highest.

Two Guttman type scales (1) have been constructed, one with six items, the other with eight items, both have excellent metric qualities, as is shown by the different coefficients computed (1): C.R. reproductibility coefficient, Green criterion K, Dubois-Loevinger homogeneity coefficient H. These coefficients are the following:

	C.R.	K	H
Scale of 6 Items	.94	.51	.60
Scale of 8 Items	.94	.51	.55

The answers were coded by two methods. In a first step, a simple dichotomy was used, i.e. negative answers ("never") were coded 0, whereas affirmative answers were coded 1, whether these answers were "sometimes" or "frequently". /26

In a second step, the answers were weighted (hence the name weighted scale), i.e. the negative answers to filter question 18 were coded 0, whereas the answers to questions in the form of scales were coded 1, 2 or 3. Accordingly, we hoped to increase the discriminating capability of the scales by putting more weight on extreme answers.

A preliminary factorial analysis (1) has shown the presence of a quite isolated factor representing annoyance from aircrafts in which the items selected for both scales had practically the same saturation

(1) See chapter 5: Statistical Synthesis of the Results.

in this factor; which makes it possible give the same weight to each item in both scales.

Finally, a factorial range has been computed from the saturated questions in this annoyance factor, with the behavioral items and other questions shown in the questionnaire, and which were selected by the authors of investigations at Orly and Saint-Cry-l'Ecole (Ifop studies 1973 and 1975) (2) to construct an annoyance index "GO". This factorial range has been first computed with the ratings shown in the Ifop studies (GO_1 index), then with ratings derived from the new factorial analysis performed on data concerning residents next to the 4 airports presented in this survey (GO_2 index) (3).

Correlations between individual annoyance and the psophic index N of exposure to noise have been calculated for the five modes of evaluation.

	Scale of 6 Items		Scale of 8 Items		Factorial Range	
	Simple	Weighted	Simple	Weighted	GO_1	GO_2
Correlation With Psophic Index N..	.25	.32	.26	.32	.32	.34

These results illustrate on the one hand that rating the answers /27 improves the correlations with the levels of exposure to aircraft noise, and on the other hand that a scale of eight items does not add to the measuring value versus a scale of six items. Finally, the use of a factorial range gives equivalent results. The burdon of calculating an individual factorial range and the extremely close correlations existing between the various measuring instruments tested, lead us to the conclusion that the Guttman scale with six items is the best most suitable method of translating the level of annoyance from light aircraft noise. Accordingly, this was the only technique used for finding all results presented here.

This scale is presented below, each item is listed in the order of percentages increasing with positive answers, calculated for all individuals interviewed.

Noise from light aircraft:

.causes house vibrations	10%
.makes it hard to concentrate	17%
.annoys conversations	20%
.makes a person nervous,	22%
.disturbs radio or TV listening	29%
.disturbs moments of rest, relaxation	32%

(2) "Correlation between noise and annoyance in the vicinity of Orly"- Ifop - Jan. 1973; "Annoyance from Light Aviation" - Investigation conducted around St-Cyr-l'Ecole airport" - Ifop-Etmar - Aug. 1975.

2. Position of Light Aircraft Noise Among Ambient Noises

2.1. Presence of Light Airplanes

Several filter questions were asked at the beginning of the interview in order to evaluate the presence of different ambient noise categories and to identify individuals who hear light aircraft noise and who are bothered by it.

Q. 14: "What kind of noises do you hear in this neighborhood?" (Spontaneous answer: airplane noises).
Q. 15: "From this list, which noises do you hear around here even if you have already mentioned them?"
Q. 16: For those who answered "airplane noises" to Q.14 or Q.15: "What kind of airplane noises do you hear around here?"
Q. 17: For those who did not mention small aircraft from the local airport to Q.16: "Do you hear from your residence small propeller planes from the local airport?" /28

After the interview, each individual was asked to evaluate a range from 0 to 10 the annoyance caused by each category of ambient noise (sero means that even though the noise in question is heard, it is not at all annoying and 10 means the noise is extremely annoying .

After these questions, we pass to Q.37 for people who did not hear small aircraft from the local airport. For those who heard the noise, but who answered for question 22 that they were not at all annoyed, the interviewer did not ask questions 23 through 36.

2.1. Position of Light Aircrafts Among Different Ambient Noises

The presence of light aircrafts among different ambient noise sources applies to Chavenay and also to Guyancourt, even though very slightly, as is shown by the frequency adjacent residents mention it on their own initiative (see the next table).

At St-Cyr-l'Ecole and at Chelles-le-Pin, road traffic dominates. It may be noted that it is also frequently mentioned at Chavenay, but considerably less at Guyancourt.

Finally, other noises are mentioned with considerable frequency: helicopters, more often at Chavenay than elsewhere, neighbors, children and dogs, combined here into one category and mentioned quite often at St-Cyr-l'Ecole (where 94% of the people interviewed live in an apartment).

2.2. Respective Importance of Annoyance From Light Aircraft and From Other Sources of Ambient Noise

/30

The ranges assigned by people living near airports to different ambient noise sources, in order to evaluate the extent of the annoyance they feel, have brought to light:

.the predominance of annoyance from small aircrafts at Chavenay

PRESENCE OF DIFFERENT AMBIENT NOISE CATEGORIES

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
Aircraft Noise				
.Spontaneously mentioned....	[93]	[67]	37	30
.Chosen on the list.....	6	14	27	[38]
	99	81	64	68
.Spontaneously select propeller planes, small aircrafts, etc.....	94	68	62	62
.Heard, if reminded.....	5	13	7	21
	99	81	69	83
Highway Traffic Noise (cars, trucks, cycles)				
.Mentioned spontaneously....	61	47	[63]	[73]
.Chosen on list.....	6	9	6	2
	67	56	69	75
Helicopter Noise				
.Mentioned spontaneously....	[15]	1	5	1
.Chosen on list.....	23	15	18	12
	[38]	16	23	13
Noise from Neighbors, Children, Dogs				
.Mentioned spontaneously....	40	38	[51]	31
.Chosen on list.....	8	8	16	13
- - - - - - - - - - - - - - - - - -	48	46	[67]	44

.minimum importance at Guyancourt, at least in absolute value, for in relative value it is rated slightly higher than for highway traffic;

.of secondary importance at St-Cyr-l'Ecole and at Chelles-le-Pin where highway traffic appears to be clearly more annoying for residents adjacent to the airport.

ANNOYANCE RANGES RELATING TO DIFFERENT AMBIENT NOISES
(averages out of 10)

	Chavenay	Guyancourt	Saint-Cyr	Chelles
.Small aircraft noise.....	6,59	5.58	3.76	3.34
.Large aircraft noise.....	2.18	2.03	1.34	1.69
.Helicopter noise.....	3.60	2,28	2.26	1,21
.Highway traffic.....	3,88	4,57	5,22	4,88
.Railroad noises.....	0,65	0,60	0,62	1,10
.Construction noises.....	0,52	1.72	0,52	2,56
.Noise from neighbors, children, dogs	2,07	2,07	3,77	3,55

/30

2.3. Net Noise Impact From Light Aircraft

/31

Data collected on the table below make it possible to draw two conclusions:

a) Residents next to Chavenay are distinguished from the others by the large percentage of them who state they are annoyed by small aircraft noise.
b) The number of individuals annoyed, evaluated from the disturbance from various daily activities (range above zero at scale rated with 6 items) is below that of individuals who answer a single and general, less "objective" question (Q.22).

The same applies if we compare the average annoyance per airport on the basis of a single question (range out of 10, assigned to Q.18 for the annoyance from small aircrafts), and from a rated scale of 6 items (range calculated from 10 levels also):

3. Scales and Circumstances of Annoyance From Light Aircrafts

/32

3.1. Intensity and Frequency of Noise From Light Aircrafts

The noise produced by light aviation traffic is perceived differently at each airport, even if it is considered during the period of the year.when it is heard the most.

/31

	Chavenay	Guyancourt	Saint-Cyr-1'Ecole	Chelles-le-Pin
	%	%	%	%
Q.14-Spontaneously mention aircraft noises.....	93	67	37	30
Q.16-Spontandously mention small aircrafts as source of noise.....	94	68	62	62
Q.22-Answer they are annoyed by noise from small aircrafts (highly, moderately, a little).	92	67	46	46
Have a range above zero on the rated annoyance scale of 6 items (see Chap. 2 - pargr. 1).....	86	55	34	34
Level of Annoyance From Small Air-Crafts				
.Average annoyance calculated from the evaluation made by residents of Q.18.....	6,59	5,58	3,76	3,34
.Average annoyance calculated from rated annoyance scale of 6 items (see Chap. 2 - paragr. 1).....	5,48	3,75	2,98	2,72

It tends to appear:

/32

(Q.21) .strong at Chavenay and at Guyancourt (65%), to a less. extent at St-Cyr-l'Ecole also;
.weak at Chelles-le-Pin;

(Q.22) .annoying for most residents at Chavenay (65%), for a smaller percentage at Guyancourt (39%);
.little or not at all annoying for most of those who hear it at St-Cyr-l'Ecole and at Chelles-le-Pin;

(Q.23) .as a frequent annoyance at Chavenay, considerably less at Guyancourt and even less at St-Cyr and at Chelles.

/33

3.2. Moments of Annoyance

(Q.19 & 20) Most people exposed to light aircraft noise say they hear it more at certain moments of the year: during the Spring and especially during the Summer.

(Q.24 & 25) Most people say they are bothered more at certain moments of the day: the most often during the afternoon.

/32

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
-When they hear it the most, the noise of small airplanes from the local airport seems:				
.very or quite loud.....	[80]	[57]	37	33
.quite or very soft.....	19	25	31	[50]
Total number of those who hear it.	99	81 *	69 *	83
-Generally speaking, this noise annoys them...				
.considerably or moderately.....	[65]	39	23	20
.little or not at all.....	34	42	[47]	[63]
	99	81	69 *	83
.very or quite frequently.....	[68]	35	15	18
.sometimes or (almost) never.....	31	46	[54]	[65]
	99	81	69	83

*All results are rounded off, sums may slightly differ.

(Q.26) The graph represents the moments of the day where the annoyance is felt the most, thereby making it possible to observe an analogous distribution for the 4 airports studied; most people are annoyed between 2 p.m. and 6 p.m. (see graphs on the following pages. /33

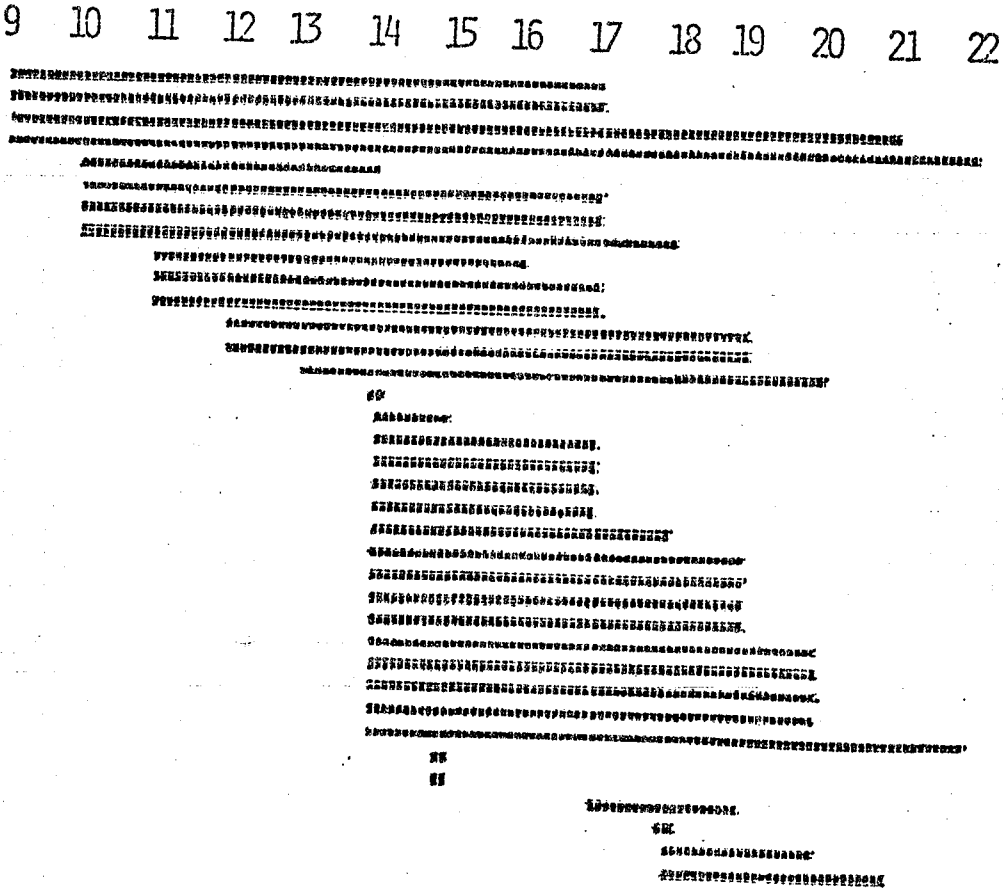
(Q.27) Small airplane noise is more annoying during the week-end than during the week; this is the opinion of residents near Chavenay airport, 2/3 of the residents at Guyancourt and a smaller percentage at St-Cyr and at Chelles where annoyance is generally felt less.

3.3. Low Overhead Flight and Fear of Accidents /38

(Q.33 & 34) If we believe the residents interviewed, overhead flights around the airport at unusually low altitudes would be quite frequent at Chavenay, and less frequent at the other airports (see table below).

Discussions during the pilot phase of the survey revealed the sensitivity these residents have toward pilot violations, whether real or imagined. Accordingly, their annoyance from light aircrafts seems to be directly related to a lack of respect of aviation regulations. Such reports from these residents should, of course, be investigated.

MOMENTS WHEN ANNOYANCE IS FELT
THE MOST AT CHAVENAY (36 ANSWERS)

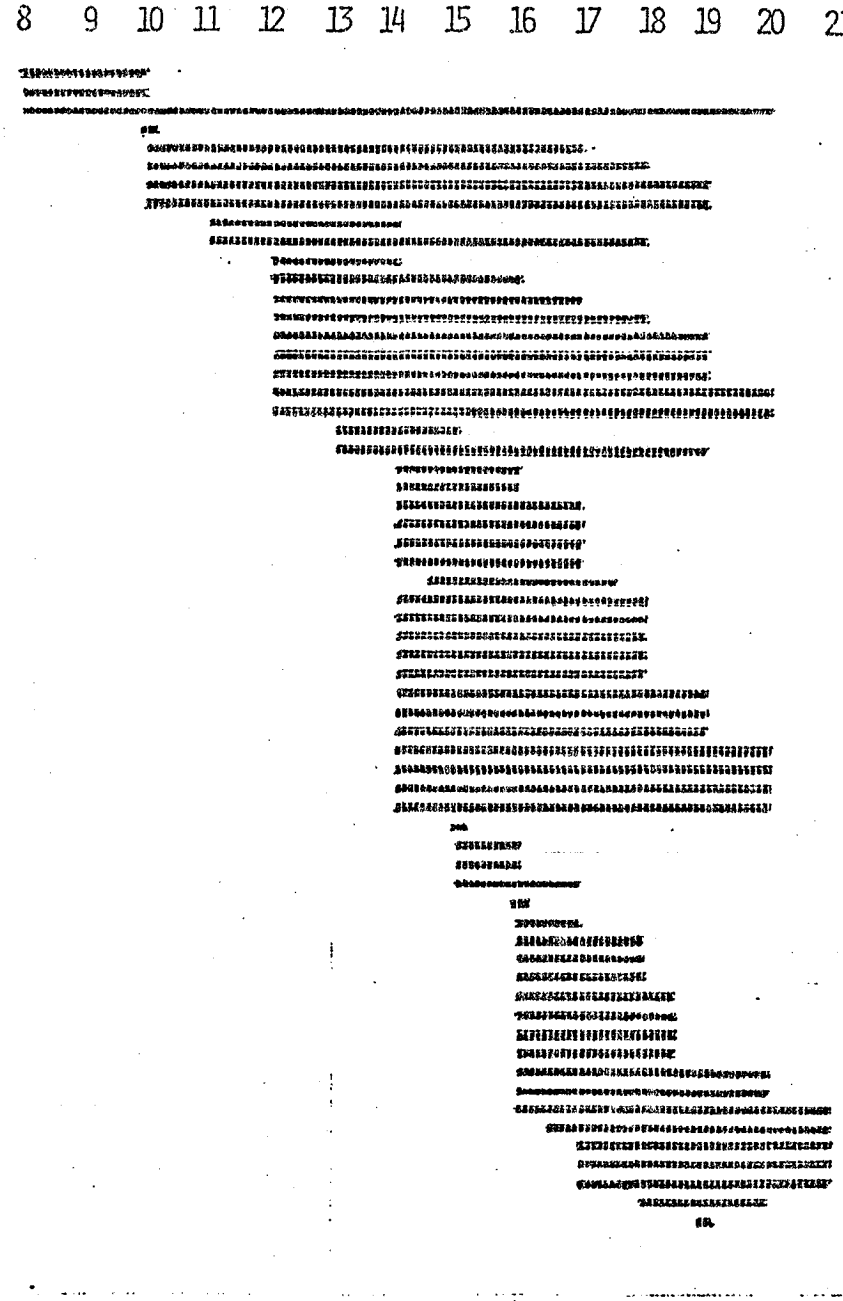


4	8	11	13	14	30	30	27	27	20	17	10	4	2	*

*Number of individuals particularly annoyed at the different hours.

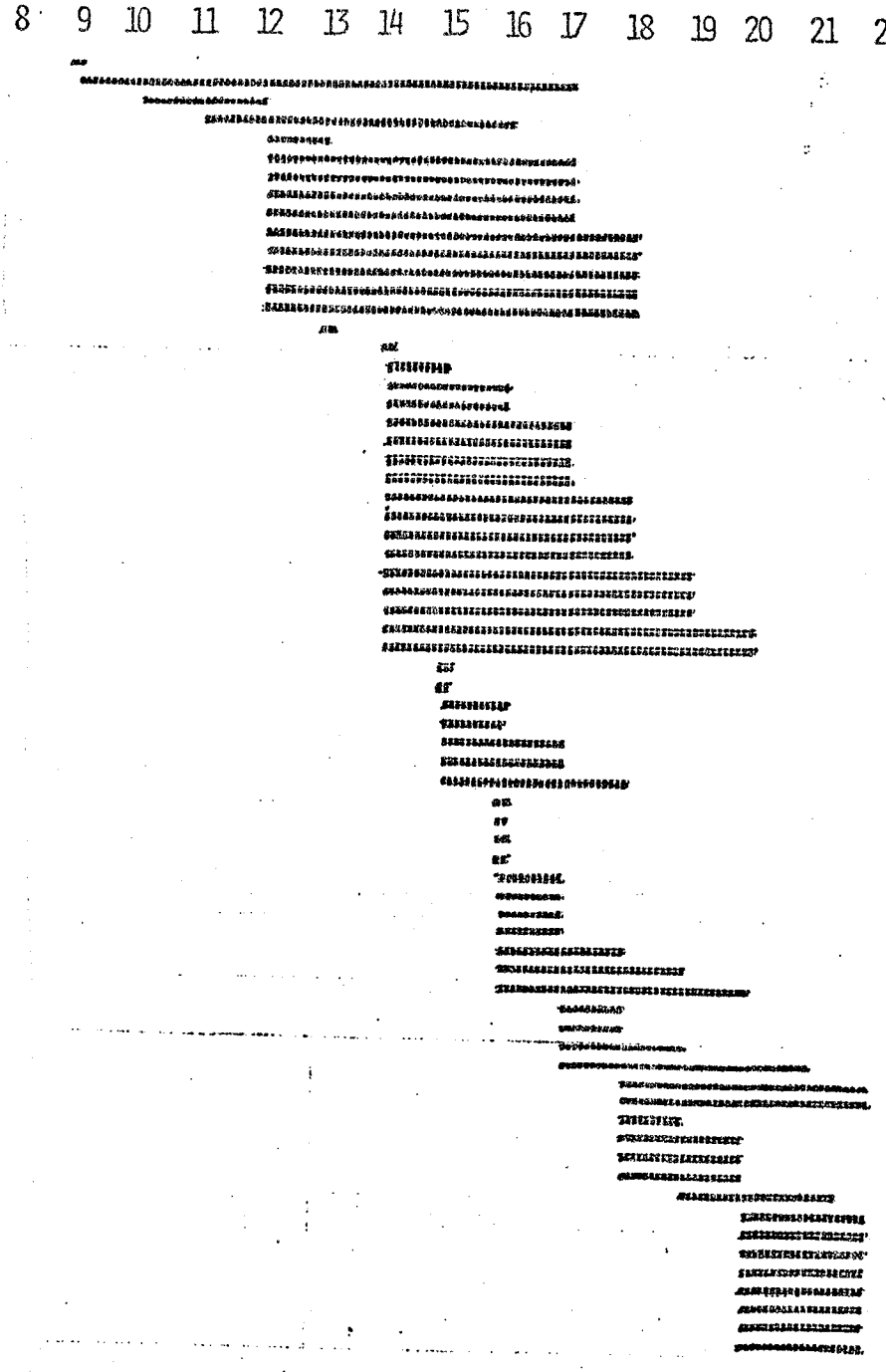
MOMENTS WHEN ANNOYANCE IS FELT THE MOST
AT GUANCOURT (62 ANSWERS)

/35



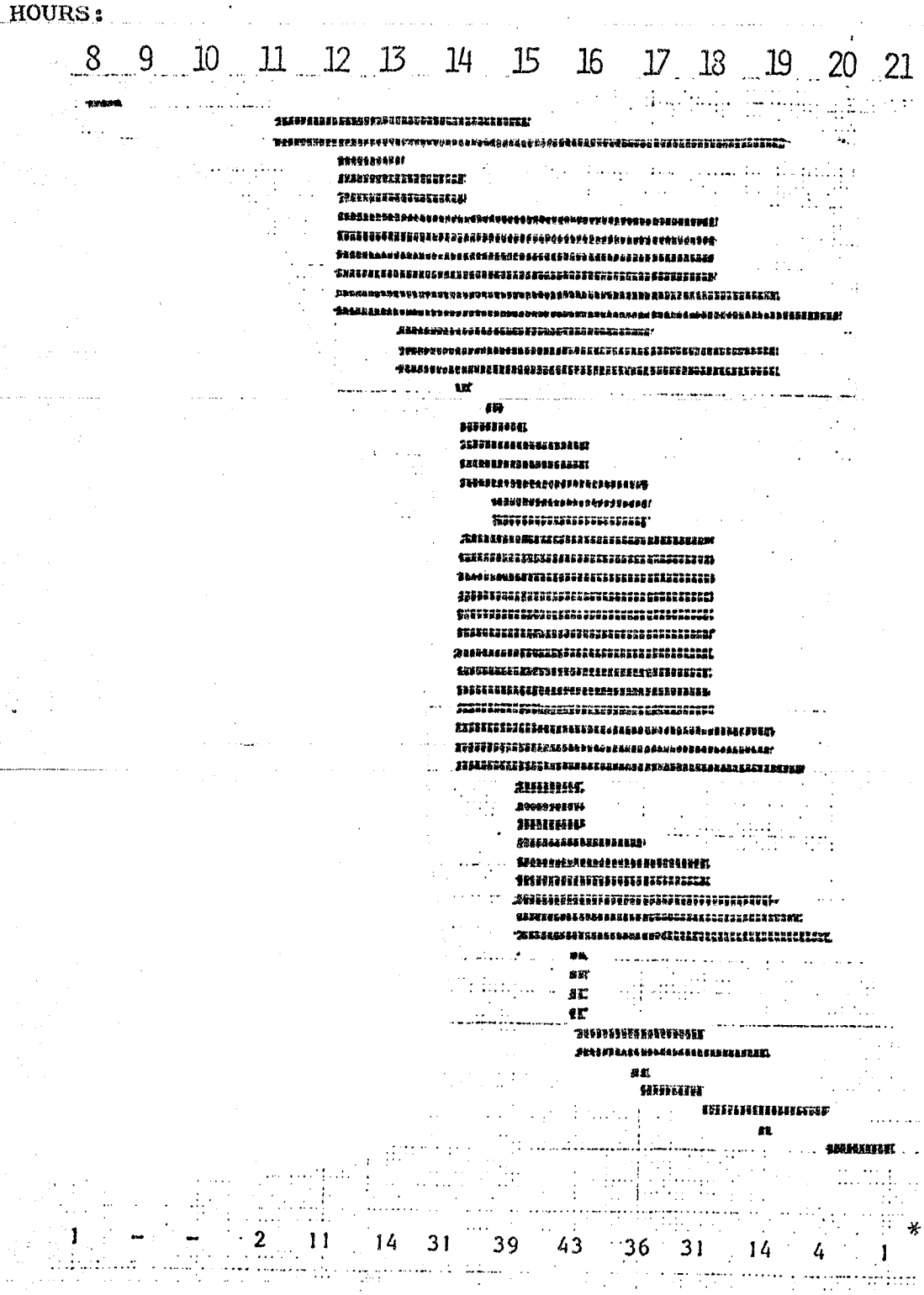
*Number of individuals particularly annoyed at the different hours.

MOMENTS WHEN ANNOYANCE IS FELT THE MOST AT ST-CYR-L'ECOLE (69 ANSWERS)



*Number of individuals particularly annoyed at the different hours.

MOMENTS WHEN ANNOYANCE IS FELT THE MOST AT CHELLES-LE-PIN (56 ANSWERS)



*Number of individuals particularly annoyed at the different hours.

/38

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
-See small planes flying too low	%	%	%	%
.very or quite often	40	16	16	11
.sometimes	21	25	13	19
	61	41	29	29 *
.never	38	40	40	53
Total number of individuals who hear propeller planes	99	81	69	83
-Have already feared seeing a small plane crash				
.very or quite often	15	13	10	8
.sometimes	22	26	11	15
	38 *	39	21	23
.never	61	42	49	59
	99 *	81	69	83

*The difference between the result for two grouped categories and the sum of two percentages is due to the fact that these percentages have been rounded off.

(Q.31 and 32) The fear of accidents appears percentagewise more often at Chavenay and at Guyancourt.

3.4. Type and Circumstances of Annoyance During the Week and Week-Ends

/39

(Q.28 & 29) These results are presented on the next table by comparing the figures relating to the week days and week-end and arranging in order the problems caused by light aviation according to the frequency of each one for Chavenay during week days. The result is a quite different hierarchy of problems from one population sample to another:

.At Chavenay, light airplane traffic disturbs resting and relaxation periods of residents in their homes; it prevents them from opening their windows or relaxing in their gardens during nice weather; it makes them nervous, irritable; and these effects occur mainly during the week-end for most people sampled.

.At Guyancourt, light aircraft traffic disturbs resting periods of these residents and their social life considerably less; on the other hand, it disturbs to the same degree radio and TV listening.

TYPE AND CIRCUMSTANCES OF ANNOYANCE FROM LIGHT AVIATION
WEEK DAYS AND WEEK-ENDS

/40

Noise from small planes annoys residents sometimes or often when it:	Chavenay %	Guyancourt %	St-Cyr-l'Ecole %	Chelles-le-Pin %
	w.d.-w.e.	w.d.-w.e.	w.d.-w.e.	w.d.-w.e.
.disturbs relaxation periods at home.....	45 / 71	31 / 44	15 / 22	16 / 22
.prevents them from opening windows, go or garden.....	40 / 65	21 / 30	10 / 13	6 / 7
.makes them nervous, irrit.	37 / 53	21 / 24	13 / 18	11 / 14
.annoys radio or TV listening.....	30 / 43	30 / 35	18 / 24	23 / 26
.annoys conversations in the home.....	22 / 46	18 / 26	10 / 16	10 / 13
.disturbs reception of TV picture.....	20 / 26	22 / 24	6 / 7	26 / 27
.bothers concentration for reading, writing, thinking, etc.....	18 / 36	17 / 23	11 / 13	8 / 9
.causes house vibrations...	17 / 20	12 / 14	5 / 5	8 / 9
.awakens them prematurely.....	9 / 19	7 / 16	4 / 6	4 / 6
.frightens them.....	6 / 10	2 / 4	3 / 4	2 / 2
.prevents sleeping.....	5 / 8	3 / 6	2 / 4	5 / 7

/39

.At St-Cyr and especially at Chelles, noise from small planes is particularly annoying to radio and TV listening.

.In the vicinity of the 4 airports, a small percentage of the residents complain that propeller planes vibrate their home, awakens them too early in the morning, keeps them from sleeping or frightens them.

3.5. Annoyance From Current Traffic and Fears of Future Expansion

Conversations during the exploratory phase at Chavenay /41
brought to light that protests from the residents were not only motivated by annoyance from present light aircraft traffic, but often primarily by the fear of future expansion, namely the inclusion of commercial planes, i.e. jets. These fears arose when a new control tower and new hangers were constructed.

(Q.39) Sampling results made it possible to measure the extent of these fears: they are more widely spread than the current annoyance from small aircrafts, particularly at Chavenay, whereas this is not the case at St-Cyr.

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
.Fear the annoyance will increase in the future.....	[87]	[49]	18	[27]
.Say they are annoyed now by today's traffic.....	65	28	18	10
.Both of the above.....	(60)	(16)	(5)	(6)

(Q.39a) Comments made to support these answers show that the fear is mainly of an increase in the present traffic at Chavenay, at St-Cyr and at Chelles, whereas at Guyancourt, people fear more the opening of the airport to commercial aviation and to larger and noisier planes.

4. Protests Already Made and Measures Taken in This Regard /42

4.1. Frequency of the Complaints

Demonstrations have already been made to protest the noise of propeller planes at various levels, depending on the airport. At Chavenay, more than half the residents
(Q.35) questioned (55%) have already signed a petition or attended a public meeting; at Guyancourt this percentage amounted to 20%. At St-Cyr-l'Ecole and at Chelles-le-Pin, this percentage remains low: 4% and 2% respectively.

(Q.36) Measures taken by using these methods or others also vary with the airports. If the percentages of residents ready to complain remains comparable to those who have already protested at Chavenay and at Guyancourt, the percentages increase considerably around the other two airports.

(Q.37 & 38) Finally, the assumed reputation and scope of the protests appears to be very large at Chavenay, quite large at Guyancourt and smaller, but not negligible, at St-Cyr-l'Ecole and at Chelles-le-Pin.

The table below presents these overall results:

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
-Have already protested against noise from propeller planes...	55	20	4	2
namely by:				
.signing a petition.....	48	15	3	1
.attending a public meeting...	29	5	1	-
-Have already protested and are ready to protest again.....	27	7	1	1
-Have not protested yet, but are willing to do so.....	14 (41)	18 (25)	7 (8)	10 (11)
-Have not protested and have no desire to do so.....	30	43	58	71
-Have the feeling that protestors in their community are very or moderately numerous.....	[82]	34	20	12
-By knowing who lives around their home.....	[77]	33	19	12

/43

4.2. Relationship with Exposure to Aircraft Noise

A synthetic trend index of protests to aircraft noise (factor range) has been constructed from answers to the two questions examined below (Q.35 and Q.36) and is concerned with actual complaints and measures. /44

The next table illustrates how this index varies (calculated out of 10) with the airports and zones of exposure to airplane noise.

Examination of thisttable confirms the paradoxical situation of the residents from Chavenay. Not only is the trend to protest higher around Chavenay than around the other airports, whereas these people are less exposed to aircraft noise, but those who are the least exposed are the ones who complain the most.

	Chavenay	Guyancourt	Saint-Cyr-l'Ecole	Chelles-le-Pin	-a-
Zone 1 : N = 70 to 75	5.86	3,05	3,05	2,94	3,49
Zone 2 : N = 76 to 82	4,95	3.55	2,51	2,54	3,09
Zone 3 : N = 83 - 87	-	5,05	3,11	2,84	3,50
Zone 4 : N = 88 & + ...	-	(4,00)*	-	2,50	2,73
-b-	5,48	3,75	2,98	2,72	

Key: a-average per sound class; b-average per airport; *-number of individuals interviewed less than 10.

- -

It may be observed that there is no relationship between the protest trend and the level of exposure to noise for St-Cyr and Chelles. At Guyancourt, the reaction of residents is logical: the trend to complain increases with the index for the exposure to airplane noise. The reactions of residents from St-Cyr and Chelles requires further explanation.

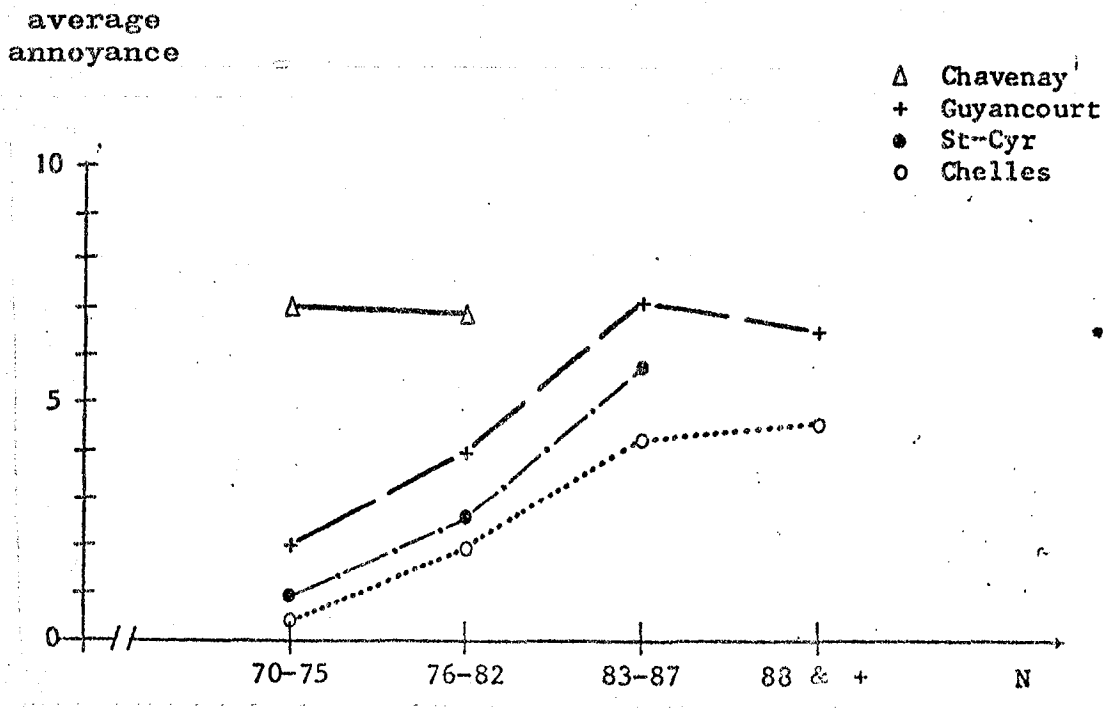
The assumption of a "saturation" related to the large number of displacements, if it is plausible for St-Cry, this is not the /45 case for Chelles which has the least amount of traffic of the four airports. There are two probable reasons: the socio-economic composition is more modest at St-Cry and even more so at Chelles than at Guyancourt and Chavenay; growth of the Chelles and St-Cyr airports is saturated, whereas future expansion of the Chavenay and Guyancourt airports has already been brought up to various extents.

5. Variations of Annoyance with the Psophic Index

Let us recall that the survey has been conducted around four airports on neighboring residents living in areas where the psophic index value N is equal to or above 70. Curves of equal exposure to noise levels of light aircrafts (isopsophic curves), has made it possible to define for each airport four areas in which residents will be interviewed. The distribution of the residents questioned has been provided in the introduction. Some areas have turned out to have an inadequate population density for providing the theoretical number of interviews required in the survey schedule. This explains the absence of some points on the curve in the next table.

Zones of Exposure	Chavenay	Guyancourt	Saint-Cyr-l'Ecole	Chelles-le-Pin	Average per Zone
70 à 75	7,05	1,83	0,77	0,63	1,88
76 à 82	6,75	4,03	3,06	2,77	3,67
83 à 87	-	7,34	5,44	3,75	5,42
88 et + ...	-	(6,25)*	-	4,07	4,50
Average per Airport.....	6,90	4,86	3,09	2,80	

* = small representation (less than 10 individuals)



Annoyance averages increase with the level of exposure to airplane noise up to zone 3, with statistically significant differences from one zone to another, except at Chavenay where the average annoyance, higher than for the other airports, does not vary significantly from one zone to another. It may also be noted that there is a plateau for the most exposed zone which could correspond to a saturation. /47

These results may be synthesized by computing the correlation factor between annoyance and the level of exposure to airplane noise. In any case, since Chavenay has shown individual characteristics on more than one point in results found up to now, the computation has been performed in three cases: for all airports (4), Chavenay only, the other three airports together.

	Scale of 6 Items		Scale of 8 Items	
	Simple	Weighted	Simple	Weighted
Correlation with Psophic Index N.....				
.For all 4 airports.....	.25	.32	.26	.32
.For Chavenay.....	-.16	-.07	-.19	-.06
.For the 3 other airports.	.37	.41	.37	.41

Examination of this table confirms, first, the superiority of the weighted scale of 6 items over other means of measurement shown in chapter 2. The level of the correlation coefficients, which remains low even though the constructionoof the annoyance evaluation instruments has been refined, is due to the fact that this is for an individual annoyance, which is formed of personal factors which sometimes cause substantial inter-indivudual variations. On the other hand, if we compute the correlation between the average annoyance per zone of exposure to airplane noise and the psophic index, we would find a higher value (.61), which has already been found by other studies, particularly the Ifop investigation around Orly where the coefficient thus rose from .21 to .68.

It is probably these personal factors which explain the statistical indepdendence of annoyance expressed by comparison with the exposure to airplane noise and which is manifested by a very small correlation with the psophic index N, regardless of the annoyance measuring instrument used. Accordingly, other factors must be investigated to explain the origin of the annoyance felt at Chavenay: individual sensitivity to noise, environmental quality, socio-economic factors, fear of local airport expansion, etc.; this shall form the objective of the next chapter. /48

6. Importance of the "Traffic Volume" Variable for the Computation of the Psophic Index

Let us recall that between the psophic index I and the average noise level L expressed in dB (N), we may establish the relationship:

$$L = I + 32 - 10 \text{ Log } N$$

in which N is the number of displacements on the measuring point.

Let us also recall that the yearly traffic at the four airports was the following in 1976:

Chelles-le-Pin	56 000
Chavenay	142 000
Guyancourt	176 000
St-Cyr-l'Ecole	230 000

In order to evaluate the value of the "traffic volume" variable when estimating annoyance by the psophic index, we have by the calculation restored the initial average noise level in the survey zones defined by the isopsophic curves on the one hand, and distinghished for each airport the situation of the residents interviewed in comparison with airport circuit and the take-off and landing trajectories on the other hand. We have thus obtained a certain number of different noise levels, namely 12.

The following table gives the results of this calculation and the averages for annoyance expressed by the residents exposed to these different noise levels.

It may be noted on this table (below) that residents adjacent /49 to the airport live under the airplane circuit more often than under take-off and landing trajectories (two to one), and that at Chavenay, they live exclusively under the circuit.

We have then computed the correlation between the noise levels and the annoyance evaluated per attitude scale. This correlation is .24 if we consider the four airports, and .30 if Chavenay is excluded.

We may thus see that this result is less satisfactory when we /50 consider only the noise levels than when we also take the traffic volume into account for the psophic index calculation; the correlation in this case is then, let us recall, .41.

We may nevertheless wonder if the weight given to traffic in th the computation formula for the psophic index is optimum. Other solutions may be tested during further studies, by taking as criterion the correlation between the psophic index and annoyance evaluated by the 6 item scale established in the present study.

/49

Airport	Survey Area	Location	Restored Noise Level	Annoyance Average
Chelles-le-Pin	1	Circuit	61	0,63
	2	Circuit	68	2,77
	3	Trajectory	80	3,75
	4	Trajectory	84	4,07
Chavenay	1	Circuit	63	7,05
	2	Circuit	64	6,75
Guyancourt	1	Circuit	56	1,18
	1	Trajectory	59	2,53
	2	Circuit	63	4,03
	3	Circuit	69	7,34
St-Cyr-l'Ecole	1	Circuit	54	0,77
	2	Circuit	61	2,77
	2	Trajectory	64	3,57
	3	Circuit	67	5,16
	3	Trajectory	70	5,90

Furthermore, consideration of other parameters, particularly /50
of how long the noise from light aircrafts lasts, is likely to improve the representation of the psophic index related to annoyance.

CHAPTER 3 - THE CASE OF CHAVENAY

Even though they live in areas less exposed to airplane noise, residents interviewed at Chavenay expressed more annoyance than residents from neighborhoods near the other airports, and this is regardless of the area considered. This group also protested the most, in the form of petitions or public meetings, against noise from propeller planes and are willing to protest again in other ways.

The origin of the annoyance felt at Chavenay must therefore be investigated at the level of other factors than the ambient sound level. Such factors particularly studied have been:

.individual sensitivity to noise in genral;
.annoyance due to other ambient noises;
.quality of the environment, excluding ambient noise;
.socio-economic factors: socio-professional categor' and monthly income per home;
.fear of future expansion of the local airport.

1. Influence of Individual Sensitivity to Noise in General

We have seen above (chapter 1.8) that variance analyses performed per airport and noise zone have shown that Chavenay residents are not more sensitive to noise than people living near other airports, and that individual sensitivity to noise in general does not vary on the average with the zone of exposure, even within each airport.

Accordingly, individual sensitivity to noise cannot be selected as a factor explaining the unusual situation at Chavenay.

We may note, however, a correlation between the annoyance declared and sensitivity to noise in general (1); this correlation is particularly accentuated at Chavenay: /53

.All four airports	.26
.Chavenay.....	.57
.The other three airports.....	.22

2. Influence of Exposure to other Ambient Noises and Environmental Quality

2.1. A first assumption was that Chavenay residents were less toler ant of propeller aircraft noise because they were less subjected to other ambient noises.

A table provides, for each airport, the average annoyance ranges (out of 10) assigned to people living next to airports for different ambient noise categories (Q.18) was given in chapter 2§3.1.

It seems that at Chavenay, small aircraft noise is perceived as a "disturbing noise", i.e. noise which stands out from ambient noise, whereas this is not the case for the other airports (differential effect). /54

If we calculate annoyance averages due to small aircraft noise according to annoyance levels due to highway traffic, it may be concluded that even though the annoyance relative to light aircraft noise decreases when the annoyance caused by noise from highway traffic increases.

(1) I.e. the annoyance declared is as high for an individual as he is sensitive to noise.

Annoyance range due to highway traffic	Annoyance range due to airplanes
0-1	4,44
2-3	3,95
4-5	3,36
6-7	3,09
8-10	2,88

2.2. According to a second assumption, the "disturbing effect" of light airplane noise would not only result from the absence or a low intensity of other ambient noises, but also and more generally from the quality of the local environment.

In fact, the answers to questions 2 and 3 make it possible to see that the people living near the Chavenay airport are especially satisfied with their natural environment and their living quarters.

	Chavenay	Guyancourt	Saint-Cyr	Chelles
	%	%	%	%
.Judge the life-style in their neighborhood as very pleasant (Q.2).....	78	49	29	15
Say they are very satisfied (Q.3)				
....with their living quarters.....	80	69	49	47
....with the quality of the air....	72	75	42	38
....with parks.....	64	31	37	10
....with parking facilities.....	55	26	20	19
....with city upkeep.....	35	22	27	15

3. Socio-economic Factors

/55

Considerable differences appear if we consider certain socio-economic data.

3.1. Socio-Professional Category

The following table gives for each airport the percentages and average annoyance range corresponding to the main socio-professional

Socio-Professional Category of Head of Family	Chavenay		Guyancourt		St-Cyr		Chelles	
	%	Range	%	Range	%	Range	%	Range
.Retired, inactive.....	6	3,3	4	2,5	12	2,5	[26]	2,6
.Employees, workers.....	7	5,0	18	3,3	17	2,7	[33]	3,4
.Middle Executives, small businessmen, craftsmen....	14	5,3	20	3,6	28	3,5	23	2,9
.Higher executives, liberal profes., industrialists, big businessmen.....	[68]	[6,3]	52	4,6	38	3,1	5	3,9

socio-professional categories of people questioned who live near an

This table brings to light not only the difference in socio-professional composition between Chavenay (68% higher executives, liveral professions, industrialists and big businessmen) and the other airports, but also the relationship between socio-professional level and annoyance caused by light aircraft noise, a relationship which is more distinct at Chavenay.

The correlation between these two variables is .21 for all four iarports, but .28 for Chavenay and .17 for the other 3 airports.

3.2. Monthly Income in the Home

The following table gives for each airport, the average and median income, and for each income bracket the percentage of individuals interviewed and the average corresponding annoyance range. /56

We may see that the average for annoyance declared increases with the income, regardless of the airport, and at Chavenay we may note the largest percentage of high incomes (55% of the people interviewed earn more than 8,000 F per month) and the highest annoyance levels.

The correlation between the monthly income level in the home an and the annoyance level is .24 for Chavenay. It is equal for the other three airports: .23.

4. Fear of Future Airport Expansion

/57

Some comments made during interviews at Chavenay during the exploratory investigation have shown that the extent of reactions of protests expressed around this airport could not be due as much to current propeller plane traffic as to the fear of seeing this traffic expand or convert to other forms of aircraft in the future.

Sampling results confirm this assumption (question 39).

	Chavenay		Guyancourt		Saint-Cyr		Chelles	
Average Income.....	7 500		6 500		5 500		4 000	
Median Income.....	8 500		7 500		5 500		3 500	
Income	%	Annoyance Range	%	Annoyance Range	%	Annoyance Range	%	Annoyance Range
less than 1000 F	1	*	1	*	1	*	5	2,1
. 1000 - 1999 F	2	*	2	*	3	*	8	2,5
. 2000 - 2999 F	1	*	5	*	8	1,8	16	3,0
. 3000 - 3999 F	2	*	5	*	9	2,9	21	3,3
. 4000 - 4999 F	8	*	9	2,6	11	3,5	14	3,3
. 5000 - 5999 F	4	*	10	3,3	11	3,1	10	3,0
. 6000 - 6999 F	1	*	6	3,4	12	2,3	7	3,6
. 7000 - 7999 F	9	*	12	4,6	10	3,6	4	*
. 8000 - 8999 F	21	5,9	18	5,0	12	3,7	3	*
. 10 000 - 14 999 F	21	5,9	16	5,0	8	3,5	1	*
. 15 000 F &+	13	6,5	7	5,3	1	*	-	-

"The reasons why people complain about small aircraft traffic are not exactly the same for everybody and everywhere. From the following attitudes, which one is closes to yours?" /57

	Chavenay		Guyan.		St-Cyr		Chelles	
	%	Annoyance Range	%	Annoyance Range	%	Annoyance Range	%	Annoyance Range
. You are annoyed by today's air traffic and fear it will annoy you more in the future?.....	60	7.0	16	7.0	5	7,1	6	7,4
. You are annoyed by today's air traffic, but are not concerned that it will annoy you in future	5	3,8	12	5.6	13	6.4	4	6,6
. You are not annoyed by present air traffic, but fear it will become annoying in the future..	27	4,5	33	4,4	13	4,3	21	3,8
. You do not feel you are annoyed now or will be annoyed in the future.....	8	2,6	39	2,1	68	1,9	69	2,3
	100		100		100		100	

* The average annoyance range has not been computed because the representation is too small (less than 10 individuals).

The relative fear of future traffic expansion is considerably more wide-spread at Chavenay (87% of residents questioned) than around the other airports (49% at Guyancourt, 18% at St-Cyr, 27% at Chelles).

If we consider the relationship between attitudes toward this /58 question (fear of future expansion) and the declared annoyance measured by the Guttman scale, we may observe a positive correlation of .59 between this annoyance and the fear of future expansion: this correlation is of the same order for Chavenay and the other three airports.

In other words, annoyance is high where fear is wide-spread; annoyance is low where fear is infrequent.

Accordingly, it is the high frequency of the fear of future expansion at Chavenay which explains the annoyance recorded and not the level of exposure to light aircraft noise; this is even more true since people living near the Chavenay airport reside in zones where the index is the lowest.

Analysis of correlations between the different factors studied brings to light at Chavenay a special consistency in the attitudes toward light aircraft noise. Contrary to what has been observed for the other three airports, the annoyance caused by small aircraft noise, the relative fear of future traffic expansion and the sensitivity to noise in general are highly interconnected values, whereas these three variables are independent from the index for exposure to airplane noise (N).

Chavenay				The Other 3 Airports			
	Sensitivity to noise in general	Annoyance	Fear of future		Sensitivity to noise in general	Annoyance	Fear of Future
N.....	.05	-.07	.05	N.....	.00	.41	.23
Sensitivity to noise in general		.57	.59	Sensitivity to noise in general		.22	.18
Annoyance...			.59	Annoyance.....			.59

5. Noticeable Improvements Made On Propeller Airplane Circuit at Chavenay in March 1977 /59

A few months prior to the investigation, improvements were made on the light aircraft circuit; the latter was shortened and its height was raised from 200 to 250 meters.

(Q.40) 85% of the residents interviewed in the vicinity of this airport were aware of these modifications; 27% of them noticed them personally and 58% of them became aware in another way.

These improvements seem to have had positive effects, since 25% of the people estimated that they resulted in a decline in the annoyance, only 5% thought annoyance had increased; 70% didn't notice any difference compared to the same period last year.

CHAPTER 4 - IMAGE OF THE LOCAL AIRPORT AND LIGHT AVIATION

(Q.41) 1. Frequenting the Local Airport

(Q.41) Nearly 3/4 of the residents adjacent to Guyancourt (73%) and Chelles (71%) have already gone to the local airport. Such excursions are not as customary at Chavenay (55%) and at St-Cyr-l'Ecole (43%). /61

(Q.42) These residents frequent the local airport for two reasons:

.to walk around and watch the airplanes (in analyses made by CERPAIR, it seems that this answer is more frequent for women, probably because they take their children there for walks).

.to go for airplane rides, especially for aerial babtisms.

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
-Have been to the local airport.....	55	73	43	71
.to go for a walk and watch the airplanes.....	29 (23)	58 (47)	30 (20)	54 (33)
.to go for an airplane ride (aerial babtism, trip, etc..) (1).....	11 (8)	17 (8)	9 (5)	20 (9)
.to watch aerial shows, attend aerial meeting (1).....	7 (7)	1 (1)	2 (1)	6 (2)
.to accompany a family member, a friend or acquaintance who is piloting.....	5 (3)	7 (3)	6 (4)	7 (5)
.for other reasons.....	6 (3)	2 (2)	3 (2)	2 (e)

(1) - The percentage in parenthesis indicates the proportion of those residents living near airports who have gone to the local air- for this reason during the past two years.

In order to examine these trips to the airport, (participating in airport activities: meetings, airplane rides, piloting) in relationship with the zone of exposure to airport noise, a synthetic index has been constructed on the basis of a factors analysis of all data (see chapter 5). /62

This index of trips to the airport make it possible to assign to each individual questioned a range which has been computed here out of 10 in order to make comparisons.

The table below gives the results of the analysis, which does not show a significant difference between the zones of exposure to noise or between airports.

Zone of Exposure	Chavenay	Guyancourt	Saint-Cyr-l'Ecole	Chelles-le-Pin	Average/Zone
N = 70 to 75...	4.31	3,43	4,06	3,83	3,91
N = 76 to 82...	4.00	3,63	3,49	4,26	3,99
N = 83 to 87...	-	3,86	4,11	3,96	3,95
N = 88 & + ...	-	(3,80)	-	4.38	4,00
Aver, per airport	4.21	3,62	3,99	4,07	

2. Image of the Local Airport /63

(Q.53 & 43a) The evaluations expressed on the local airport seem to vary considerably from one community to another. They are the least favorable at Chavenay, probably in relationship with annoyance from propeller plane noise.

(Q.54) It may be noted that the view of the airport is more common among residents near Chavenay.

From the main results recorded on the table below, we should point out the willingness of a large percentage (Q.43c) of residents to make trips to the local airport if it is equipped with pleasant facilities for visitors.

At Guyancourt, more than half of the residents interviewed consider the airport as a nice place to go for a /64 walk; the view of the airport and small aircraft traffic is most often considered as part of the picturesque surroundings of the community. (52%).

(A.40) This positive attitude is expressed in the opinion of 57% of the residents who prefer to keep the Guyancourt airport (its removal is planned in the city expansion projects for the new city of St-Quentin-en-Yvelines). /64

	Chavenay	Guyancourt	St-Cyr-l'Ecole	Chelles-le-Pin
	%	%	%	%
Q.54-See part or all of the airport from their windows.....	[40]	13	22	5
Q.53-Consider that the view of the airport and airtraffic...				
.takes away the charm of the community surroundings.....	[31]	14	8	4
.is part of its attraction..	19	[52]	[52]	[61]
.has not effect at all.....	50	35	41	36
	100	100	100	100
Q.43a-Consider the airport as a nice place to stroll.....	20	[53]	42	[66]
Q.43c-If pleasant facilities were added to accomodate visiters, would go once in awhile.....	32	54	[60]	[64]

/63

3. Image of Light Aviation

/65

(Q.44 & 45) A rather large percentage of the residents interviewed know people who use the local airport: 15% at Chelles, 29% at St-Cyr, but 34% at Guyancourt and 36% at Chavenay.

(Q.47) The image of pilots in the eyes of residents seems to have socio-economical undertones: for most people questioned, the sport of piloting belongs to affluent circles.

(Q.48) We know that such participants are mostly masculine.

From the point of view of age, most participants are 25 years old or more.

(Q.46) Secondary characteristics encouraging people to pilot are:

.a passion for aeronautics: "they are the addicted, the passionate, the bold who love risks, who love to fly for the sake of flying" - frequent description given by residents near Chavenay (28% bring it up on their own).

.and a certain moral and intellectual prestige: "they are upstanding people, well-mannered, out-going, serious, self-controlled, who respect regulations, they are quiet, dignified and have a certain know-how..." These characteristics are quite rare in portraits given by residents at Chavenay; it is more typical at Guyancourt.

(Q.52) Among the reasons why people learn to pilot, the most common ones given by the residents interviewed are the pleasure of flying, passtime, amusement, sport and the practicality of light aviation as a means of transport and preparation for aeronautical career. /65

This hedonistic and sports portrait rather than utilitarian one given of light avaiation is expressed the most at Chavenay.

(Q.50) Finally, the residents questioned thought the facilities should be made available to the youth of their community, giving them the opportunity to learn to pilot small airplanes. This opinion was expressed by most residents at St-Cyr-l'Ecole (83%) and at Chelles-le-Pin (85%) and by a large majority at Guyancourt (78%) and even at Chavenay (64%), in spite of the annoyance by light aircrafts and the feeling of hostility toward the airport.

(Q.51) There are two main reasons for this attitude: the possibility of learning to fly should become more democratic and it is a healthy, educational, pleasant sports activity.

The data collected on the image of the local airport and on light aviation appears to point up to the cause of protests made against the noise of propeller planes, namely, in addition to the concern about future expansion, it is because of the exclusive nature of its practice in the current status of light aviation, much more than because of its presence and effects.

CHAPTER 5 - STATISTICAL SYNTHESIS OF THE RESULTS /67

All results from the different statistical analyses of data collected during this survey will now be examined at two levels: influence of the various individual, sociological or psychological characteristics on the annoyance from light aircraft noise; factors analysis of all available data.

1. Influence of Certain Individual Characteristics

1.1. Influence of Sociological Variables

Eleven sociological characteristics have been recorded for each person interviewed and studied in relationship with annoyance from light aircraft noise for all four airports.

From these variables, four are related to the annoyance from light airplanes at the statistical threshold of .01. (This threshold means that we have less than one chance in one hundred to be wrong by stating that the variable under consideration is in relationship with the declared annoyance).

The table of the next page gives a global picture of these results.

1.2. Influence of Psychological Variables /69

Eight variables are examined here. Six of them are significantly associated with annoyance from light airplanes.

The table of page 42 presents an overview of these results.

2. Factors Analysis /70

In order to bring to light the underlying dimensions as a function of which the answers to questions are organized and to test the consistency of the results, a factors analysis has been performed by the Hotelling main components analysis method covering the main sociological variables and eight psychological variables presented in the preceding paragraph, to which we have added two location variables (psophic index of exposure to noise, position versus runway axis and circuit).

This factors analysis has been applied to all four airports.

The intercorrelations between these twenty one variables are given in the appendix.

Influence of Sociological Variables

Variables	Significance Threshold	Relationships with Annoyance From Airplane Noise
Age	-	No relationship
Sex	-	No relationship
Length of residence	-	No relationship
Private garden	-	No relationship
Connections with aeronautics	-	No relationship
Dwelling located in axis of runway or under flight circuit	-	No relationship
Noisy environment at place of work	-	No relationship
Socio-professional category	.01	(Highest in the socio-professional hierarchy - higher executives - are the most annoyed).
Total available income	.01	Those with the highest income say they are the most annoyed.
Owner or renter	.01	Owners are the most annoyed.
Living quarters	.01	People living in individual homes are more annoyed than residents of apartment buildings.

/68

Influence of Psychological Variables

/69

Frequenting the local airport	.01	No relationship
Satisfaction with environment	.05	Those who are the least satisfied with the environment ((there are a few) are more annoyed
Satisfaction with life-style in general	.01	Those who are the most satisfied with their life-style are the most annoyed
Tendancy to complain of airplane noise	.01	The most annoyed complain the most of airplane noise
Attitude toward local airport	.01	The most annoyed do not think of the airport as a nice place to walk through
Quietness from the point of view of ambient noise	.01	Those who are the least satisfied with ambient noise generally are the most annoyed.
Sensitivity to noise	.01	Those who are the most sensitive to noise generally are the most annoyed
Fear of Future Airport Expansion	.01	Those who fear future expansion the most are the most annoyed

We were able to isolate seven independent factors which explain 64% of the total variance: /70

1. Environment

We find in this factor by order of decreasing saturation, satisfaction of the ecological environment, satisfaction of the life style and nonaeronautical ambient noise.

This factor explains 11.3% of the total variance.

2. Socio-Economic Level

Four elements contribute to this factor: socio-professional category, age, length of residence and income. This factor explains 11.3% of the total variance.

3. Annoyance From Airplane Noise

This factor also explains 11.3% of the total variance. It groups by order of decreasing saturation the annoyance from airplane noise (weighted scale of 6 items), the tendency to complain of airplane noise, the attitude towards the local airport, the fear of future airport expansion, and the individual sensitivity to noise in general.

4. Exposure to Airplane Noise /71

Two elements are saturated in this factor which explains 8.6% of the total variance: the psophic index and location versus the airport (runway or circuit axis).

5. Living Quarters

The elements involved in this factor are for the type of dwelling (individual home or apartment in a building) and whether there is a private garden. This factor explains 7.9% of the total variance.

6. Working Conditions

The sex and noisy working environment make up this factor which explains 7.2% of the total variance.

7. Connection with Aeronautics

This last factor represents only 6.5% of the total variance. It includes professional ties with aeronautics and trips to the local airport.

In conclusion, the factor of noise from airplane noise stands out in comparison with the other factors, particularly the socio-economic and dwelling factors.

On the other hand, purely psychological elements are an integral part and should not be isolated, especially that of individual sensitivity to noise in general, the attitude toward the local airport

and the fear of the future expansion of this airport.

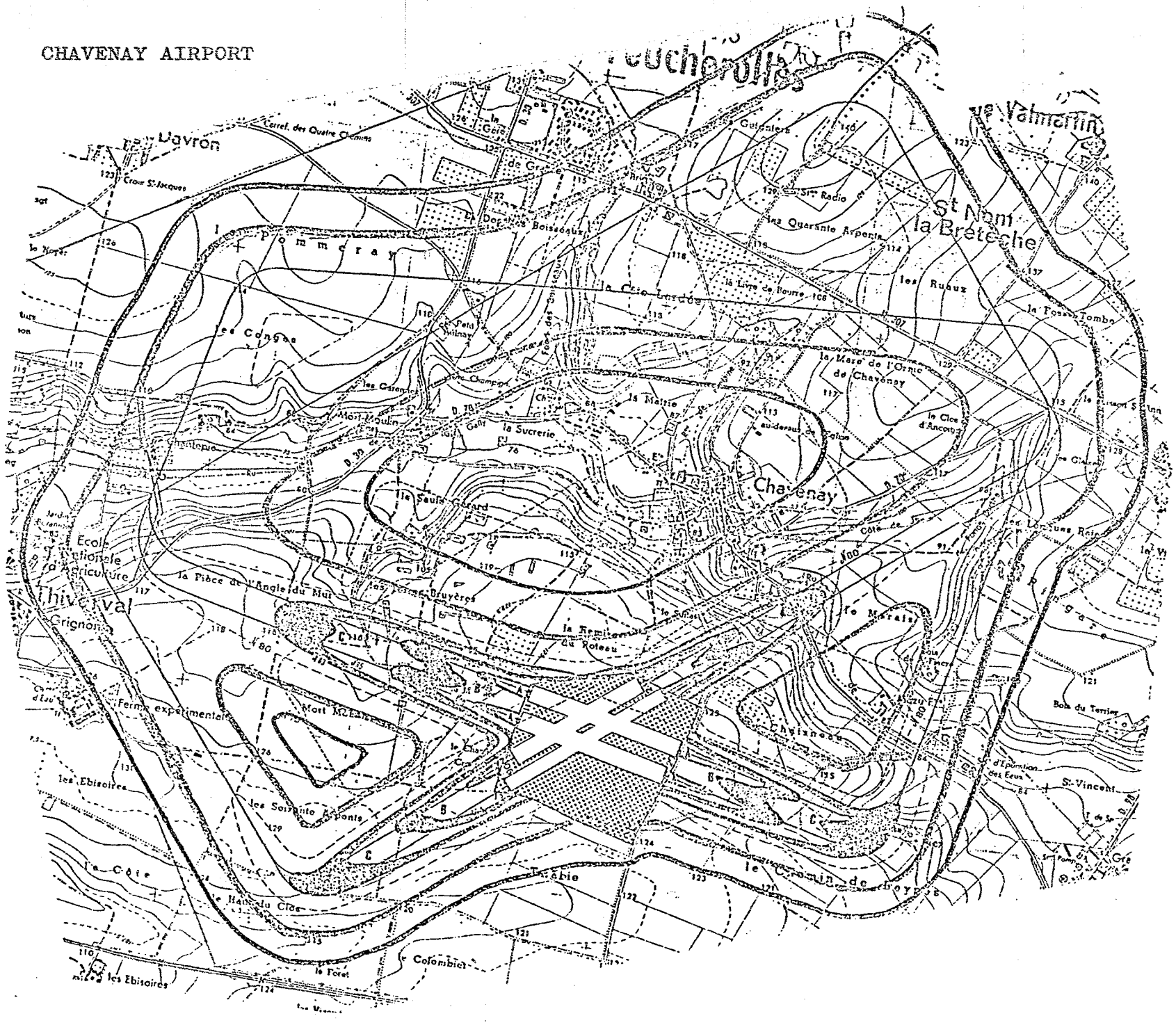
The next table groups the results of this analysis (saturation in 7 factors).

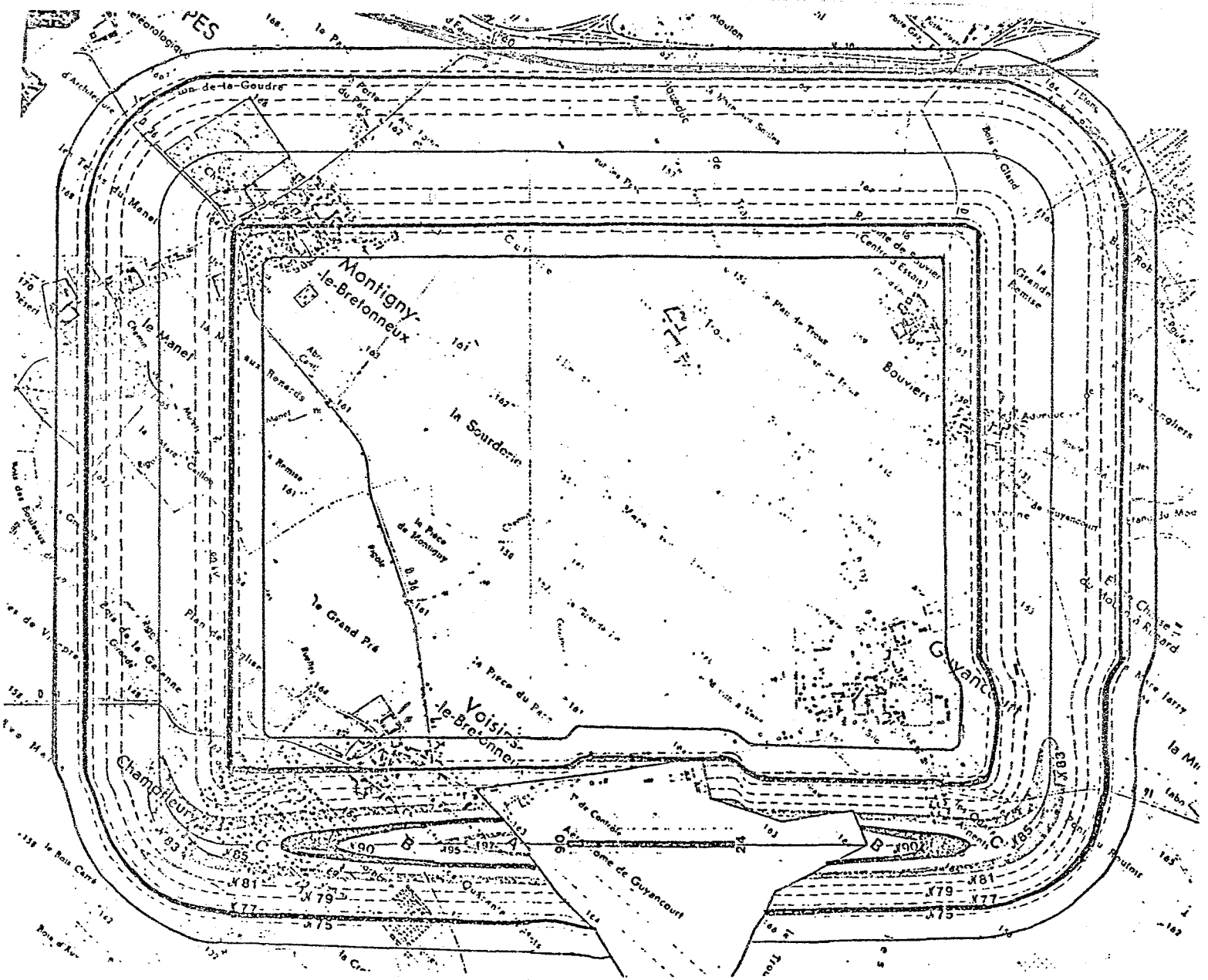
FACTORS ANALYSIS (SATURATION)

VARIABLES \ FACTORS	1	2	3	4	5	6	7
Satisfaction with environment	-.872	-.094	-.115	.072	.073	-.059	-.103
Satisfaction with life-style	-.755	-.052	-.222	-.070	-.003	-.038	-.039
Nonaeronautical ambient noise	-.646	-.146	.364	-.179	.027	.132	-.028
Age	.079	.832	.115	.021	.006	-.014	.100
Socio-professional category	.180	.744	.261	-.038	047	-.030	.283
Length of residence	-.170	-.666	-.085	.076	-.133	-.121	.269
Income level	.278	.559	.365	.004	.138	-.047	.367
Annoyance from planes	-.021	.190	699	.298	-.113	.007	-.015
Tendency to complain	.056	.087	.692	-.219	-.228	.052	.022
Attitude toward local airport	.138	.049	.618	-.042	.301	.061	-.190
Fear of future exp.	.088	-.163	.549	-.143	.288	-.091	.067
Sensitivity to noise	-.476	-.051	.492	-.006	.093	-.189	.154
Psophic index	.092	-.046	134	.844	.065	.031	.024
Location versus airport	.017	.038	.168	-.783	.060	-.051	.048
Type of dwelling	.135	-.102	.185	.223	-.755	-.097	.188
Private garden or not	.109	.055	.054	.143	.800	-.053	.144
Sex	-.056	.176	.043	.017	.025	-.848	-.109
Noisy environment at work	.002	.285	.082	.092	.044	.723	.133
Ties with aeronautics	.103	.101	.027	-.019	.160	.191	.628
Trips to the local airport	.055	.191	179	.006	.304	-.102	-.584
Owner or renting	-.259	.098	-.365	-.362	.197	.212	-.329

Key: 1-Environment; 2-Socio-economic level; 3-Annoyance from planes; 4-Exposure to plane noise; 5-Dwelling; 6-Conditions at Work 7-Ties with aeronautics.

CHAVENAY AIRPORT





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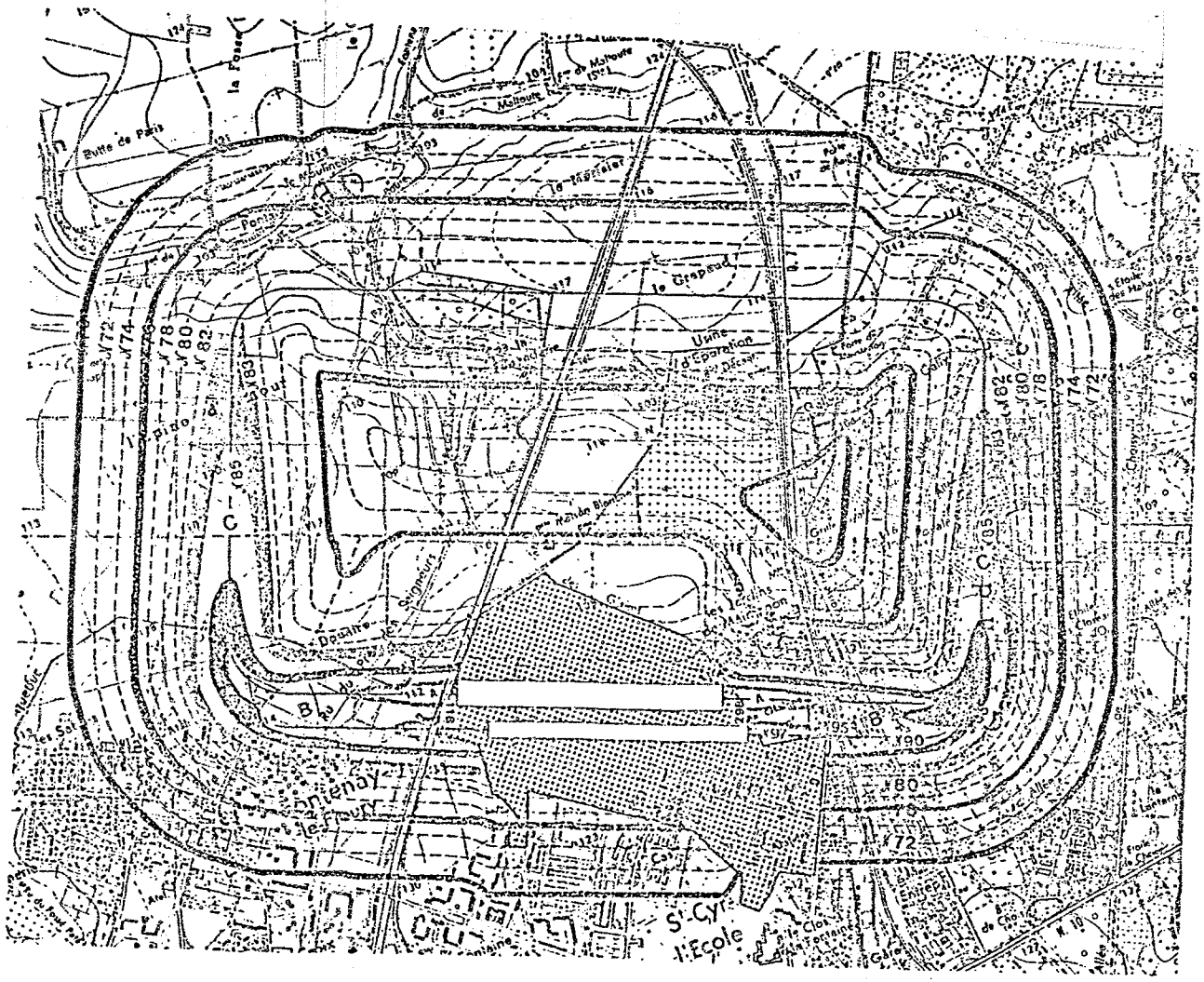
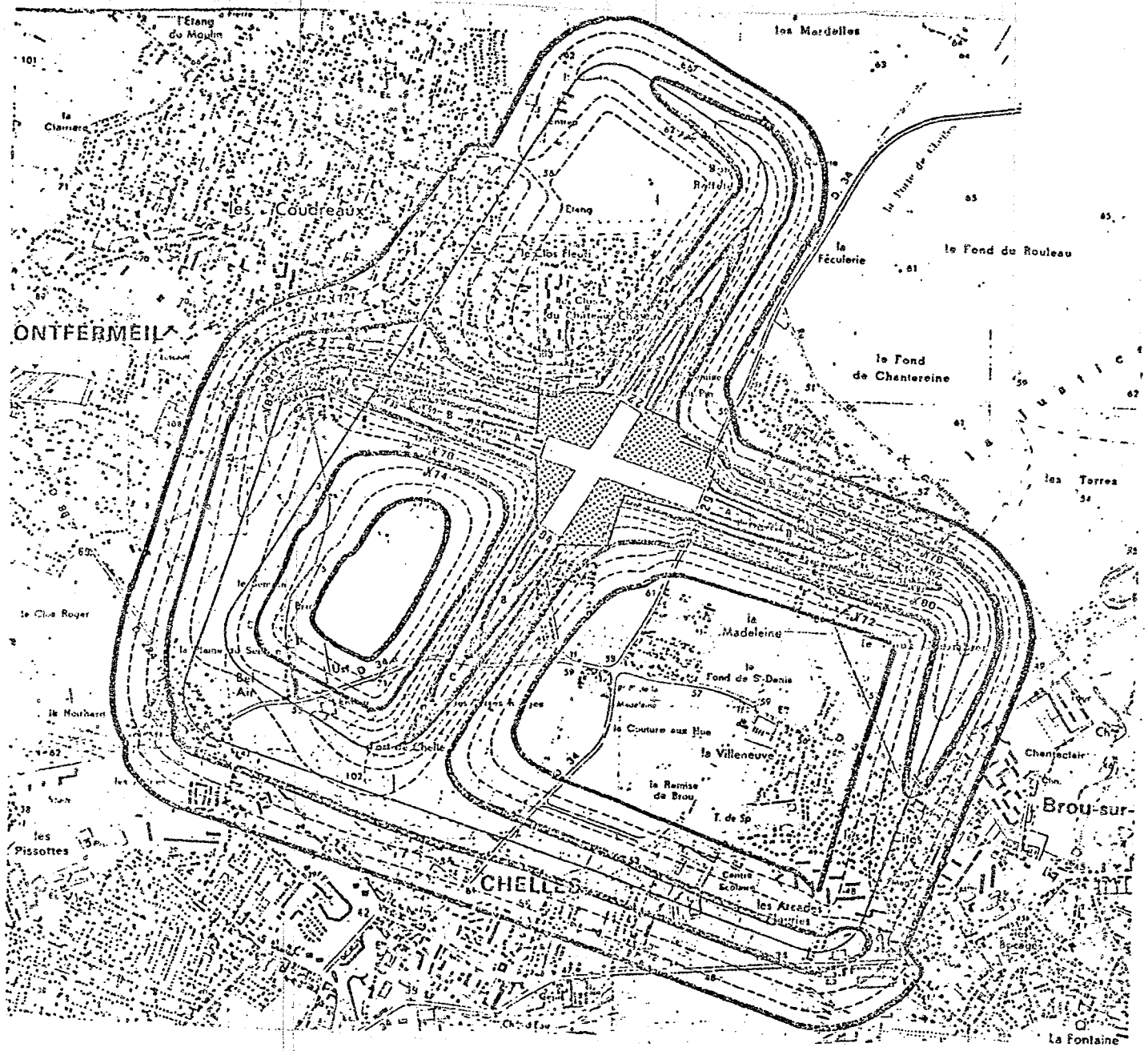


ST-CYR-L'ECOLE AIRPORT



CHELLES-LE-PIN AIRPORT